Many people suffer from them, but few know what they are.

ALLERGIES

By DR. KARL VON HOLLANDER

CAN a nice ripe strawberry be poisonous? Can the eating of lobsters, such a delicacy to most people, upset one's health? Can the lovely fragrance rising on warm sunny days from a meadow in spring make a person ill? We would be inclined to answer all these questions in the negative. But we have all heard about Miss X, to whom one would cause a very dubious pleasure by placing a potted primrose in bloom in her room because then she immediately breaks out in a nasty rash; or about Mr. Y, who is so acutely sensitive to strawberries that even a minute quantity of them, which he himself has not even noticed in the jam, is enough to cause him severe stomach and intestinal disorders. The large number of people suffering from hay fever proves that such strange phenomena are by no means rare.

A healthy person not susceptible to these effects was formerly all too inclined to dismiss such disorders as imaginary, believing that the exaggerated nervousness of the afflicted gave rise to a condition resembling illness. The usual reasoning was: "How can healthy food or a popular delicacy, how can the perfume of flowers or the air from a meadow, make anyone sick? Either there is some poison contained in it—then it must be more or less harmful to everyone. Or there is no poison in it—then it can't be harmful to anyone."

But the situation is by no means as simple as all this, and in studying these phenomena, known as allergies (from Greek *allos* other, and *ergon* work), the dividing of substances into poisonous and nonpoisonous, useful and harmful, won't get us very far.

FOR a long time, allergies were strange, inexplicable idiosyncrasies of individual people, until medical research succeeded in becoming better acquainted with and learning to understand other cases of allergy. In attempts to immunize human beings and animals against certain contagious matter, the following curious facts came to light. The attempt had been made to immunize a horse against tetanus by the injection of a small quantity of tetanus antitoxin. When after some time the same horse was inoculated again with the same serum, the animal died of it, in spite of the fact that a much smaller quantity of serum was used for the second inoculation. In the explanation advanced, it was assumed that het serum had caused a change in the blood of the animal and forced the blood to form antibodies against some substance contained in the serum. In the second inoculation the serum would then have encountered this new, altered blood and hence caused an entirely new and different reaction. The blood, so it was said, had meanwhile become allergic toward that particular substance contained in the serum. Hence by "allergy" is meant an altered reaction of the blood, while the clinical symptoms appearing in allergic diseases are sometimes referred to as "idiosyncrasies."

Further research soon revealed that the occurrence of hypersensitive blood with an altered reaction is far more frequent than had been hitherto assumed. Above all it was discovered that such changes in the composition of the blood take place not only when disease carriers or poisons enter into the blood but, in the case of many people, even when it encounters seemingly harmless substances. Proteins present in everyday food, fats, medicines, horsehair in old horsehair pillows, feathers, scurf from dogs and cats, pollen from grass and composite flowers (in Shanghai, for instance, the pollen of the privet shrub), fungus spores, dust, and many other things, can be the cause of allergies. All these substances to which an allergy may develop have a similar effect as the serum had in the case of the horse, viz., at first they cause the blood to alter its composition, and this altered blood is then allergic to the same substance the next time it encounters it. Fortunately, this allergy is in most cases not nearly as drastic in its effect as with the horse. An effect which upon the second encounter produces a serious shock or even death is rare indeed. But, nevertheless, there are enough disagreeable symptoms and often serious illnesses. For example, the mucous membranes of the eyes and nose may be affected and become inflamed; a violent catarrh may ensue which may develop into hay fever with raised temperature. In other cases it is the bronchial tubes which are affected, and tormenting attacks of bronchial asthma may occur. Other people, again, after eating certain kinds of meat or fish, eggs or flour, may suffer from disorders of the stomach and intestines, from lack of appetite, diarrhea, or vomiting. Finally, changes in the skin, nettle rash, eczema, and other symptoms are frequent.

So we see that it is a great variety of effects

and symptoms which may be brought about by an allergy of the body to certain substances. Medical science has learned to trace this variety to the same cause and can thus begin its treatment with far greater prospects of success. And it has actually succeeded within the comparatively short time since the discovery of allergies in providing many sufferers with a cure or at least relief.

Formerly, in the case of bronchial asthma the only thing one could do was to help the sufferer during each attack or to move him to a more favorable climate. In some countries, hay-fever sufferers formed associations for the purpose of discovering pollen-free areas and for mutual aid in moving bad cases to such areas during the time in which the grass is in bloom in their home districts. Nowadays one begins by making a systematic search for those substances to which the patient is allergic. Tests are made with feathers from the bedding, with fungi, with horsehair and dust from the rooms, with flour, eggs, milk, etc. It is by no means always easy to find out which substances have caused the attacks, for in many cases people are allergic to several things. But the new test methods have been worked out in such detail that they make it possible to discover the agent or agents with certainty. Once the culprit has been found, everything is done to protect the patient from it. For instance, horsehair mattresses or down pillows are banned from his bedroom; he is advised to give away his dog; he is provided with the correct diet, without eggs or milk or certain types of flour or meat.

Useful as these measures are, they unfortunately often have their limits. There is not much that can be done against dust, or spores from mildew. In this connection, an almost tragicomical case became known in medical literature. It was that of a 45-year-old woman who suffered from asthma and intestinal disorders caused by an allergy. It was discovered that she was especially allergic to horse scurf. There was not much that could be done for this poor woman, as she was married to a jockey.

Keeping away the harmful substances as much as possible is only the initial measure. Next the doctor will try to suppress the allergy, to weaken it or to remove it entirely. Fortunately, some successful methods have been found for this too. The doctor tries by giving regular small doses gradually to accustom the patient to whatever causes his allergy and in this way to desensitize him. Most successful in this respect has been the treatment of hay fever by injecting the patient with an extract of the pollen to which he is allergic. In other allergic diseases, desensitization has been employed with good results, too.

TO give an idea of the variety of allergic diseases we shall quote a few examples from medical literature.

(1) A woman patient, 32 years old, had suffered from stomach trouble since her eighteenth year. Finally, she could not stand any vegetable or fruit at all, and most other food also disagreed with her. A test showed that she was allergic to onions, tomatoes, lemons, milk, rye and wheat flour. Treatment consisting of a diet lacking these ingredients and of desensitization led after several weeks to a complete recovery.

(2) A man used often to get a nettle rash after drinking white wine, but, strangely enough, only in the case of inferior qualities. An examination revealed an allergy to fish protein. At first there seemed to be no connection whatever between wine and fish protein, until the doctor remembered that cheap types of wine are "improved," i.e., clarified, with fish bladder.

(3) In the case of a woman suffering from asthma, sheep's wool turned out to be the miscreant. In the search for the possible occasions where this substance might affect her, it was discovered that she was employed in a chemical factory where she had often to unpack shipments from Australia packed in raw wool waste.

(4) A 57-year-old patient suffered from bad attacks of migraine and for years from increasing stomach disorders, so that finally she could no longer look after her household or even do any sewing. The examination, which showed no organic disturbances, revealed an allergy to all meat and most kinds of fish. Treatment with a suitable diet and desensitization greatly improved her condition. Even small quantities of meat and fish agreed with her again.

IN the case of some people suffering from idiosyncrasies and allergies, a similar condition has been observed in their blood relatives, too. Hence it must be a susceptibility or weakness innate in the constitution of that person and which is hereditary.

Medical research of the last few decades has, by means of a more detailed observation of human allergies, learned properly to see and understand the great complex of allergic diseases. By new methods of treatment it has made cures possible even in such cases which doctors in former years regarded as hopeless. All the symptoms observed have shown that it is chiefly the sympathetic cords of the autonomic nervous system which are affected by allergies. Hence Adrenalin, a hormone extract of the suprarenal glands which influences the sympathetic cords, has proved excellent as a means of removing or alleviating allergic symptoms. Although it does nothing to attack the actual cause, the patient is often enough grateful for the relief it offers. Calcium injections also do much to alleviate the patient's condition. But both treatments do not attack the root of the suffering. Moreover, both Adrenalin

and calcium are effective in the treatment of allergies only when injected, as the gastric juices destroy their effectiveness when taken orally. Further progress was made when Western medicine took over ephedrine, the effective substance contained in the Chinese *ma huang* drug, some twenty years ago. This can be taken orally and thus makes the patient to a certain extent independent of the doctor.

The study of the allergy problem has finally also revealed the inner mechanism of this affliction. We know today that the harmful substances—mainly protein products—together with the antibodies of the organism form a new substance, histamine, which causes the symptoms. In a healthy body, the mucous membrane of the small intestine produces a ferment which destroys the histamine constantly being formed in the body. In the case of functional disturbances in the small intestine, however, or when there is an unusually large supply of histamine, the body reacts to the histamine in the form of allergies. Meanwhile new medicaments have appeared on the market which destroy histamine and are manufactured, for example, from the mucous membrane of the small intestine. That means that now, in addition to desensitizing treatments, medical science has at its command means of attacking the very root of the allergic diseases.

THREE-DIMENSIONAL WEAPON

By HELMUTH KÖHRER

The warfare in the skies over East Asia has stimulated interest in the functioning of antiaircraft artillery. The following article comes from Germany, a country with great experience in the defense against hostile bombers.

"IN 1914 we were stationed with our antiballoon cannon near Baden-Baden, where we were entrusted with the defense of an airship hangar against enemy air attacks. Whenever the approach of enemy planes was reported, we ran from our quarters to the village fire station, which housed our cannon. One of us fetched the horses, which were hurriedly harnessed and mounted, and then we rushed off at a thundering gallop with our iron-rimmed wheels through the village street to meet the enemy. . . ."

So runs the story of a German antiaircraft artillerist in the Great War. From the horse-drawn antiballoon cannon to the modern antiaircraft batteries mounted on special railroad trucks it is a far cry.

The earliest beginnings of the antiaircraft cannon go back to the Franco-Prussian War of 1870/71. To the besiegers of Paris, the balloons by means of which the French maintained communications with the outer world were a source of annoyance. For the purpose of combating them, the Krupp works constructed an antiballoon cannon with a caliber of 3.7 centimeters, mounted on a four-wheeled cart. But the five cannons of the model were unable to inflict any damage on the balloons, which flew at an altitude of more than 1,000 meters. All the greater was the moral effect when the Germans succeeded on November 12, 1870, in shooting down a balloon flying exceptionally low. From that day on, no more balloons were sent up.

During the next 35 years no more interest was shown in this new weapon. But by 1906 airships had become improved to such an extent — mainly through Count Zeppelin's flights—that the War Ministry in Berlin developed an interest in the question of combating air targets. After experiments made with field cannons along the coast proved unsuccessful, a special 5-cm antiballoon cannon was constructed, followed the next year by a 6.5-cm cannon. Here and there such cannons were used in the imperial maneuvers before the Great War. The experience gained in these tests led to the demand for 32 7.5-cm cannons for the German peace-time army. When war broke out in 1914, the German Army had altogether 18 antiballoon cannons at its disposal. A ridiculous number—yet no other country beside Germany possessed even a single antiaircraft cannon.

The Great War naturally entailed a rapid development of this new weapon. As the emphasis shifted from balloons and airships to airplanes, the demands placed upon the weapon increased manifoldly. The name was adapted to the changing target: the antiballoon cannon became the antiaircraft cannon or *Flugzeug-Abwehr-Kanone* in German, which was shortened to the now so familiar "Flak." In the course of the four years of war, the caliber of the heavy Flak rose to 8.8 and 10.5-cm. All the complicated auxiliary equipment came into being: searchlights, range finders, sound-detecting apparatus. The munition was also improved. The 18 AA-cannons at the outbreak of the war had grown by the Armistice to 2,576 cannons, which were used on all fronts.